



# 基础研究是研究生教育的摇篮

杨卫

国家自然科学基金委



# 创新驱动的国家战略

## 基础研究是创新驱动之源

### □ 体制改革

释放体系积累能量

### □ 专利

赢利型创新驱动之源

### □ 基础研究

公益型创新驱动之源

# 科学与技术的关系

□ Science of 源于 Technology

技术科学

Science by 基于 Technology

射电天文学

Science for 用于 Technology

应用物理

Science to 化于 Technology

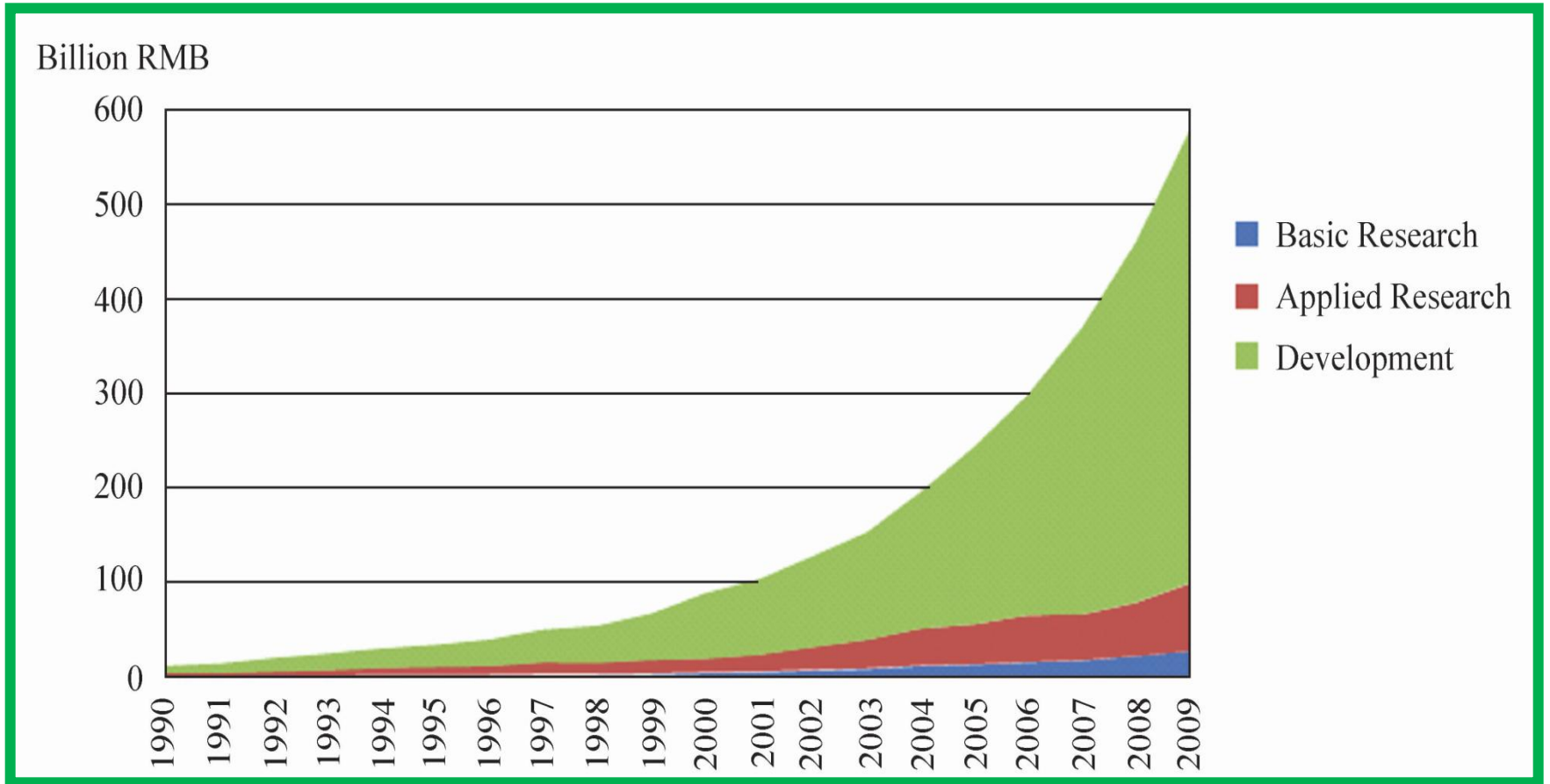
核技术

Science above 高于 Technology

纯数学、超弦理论

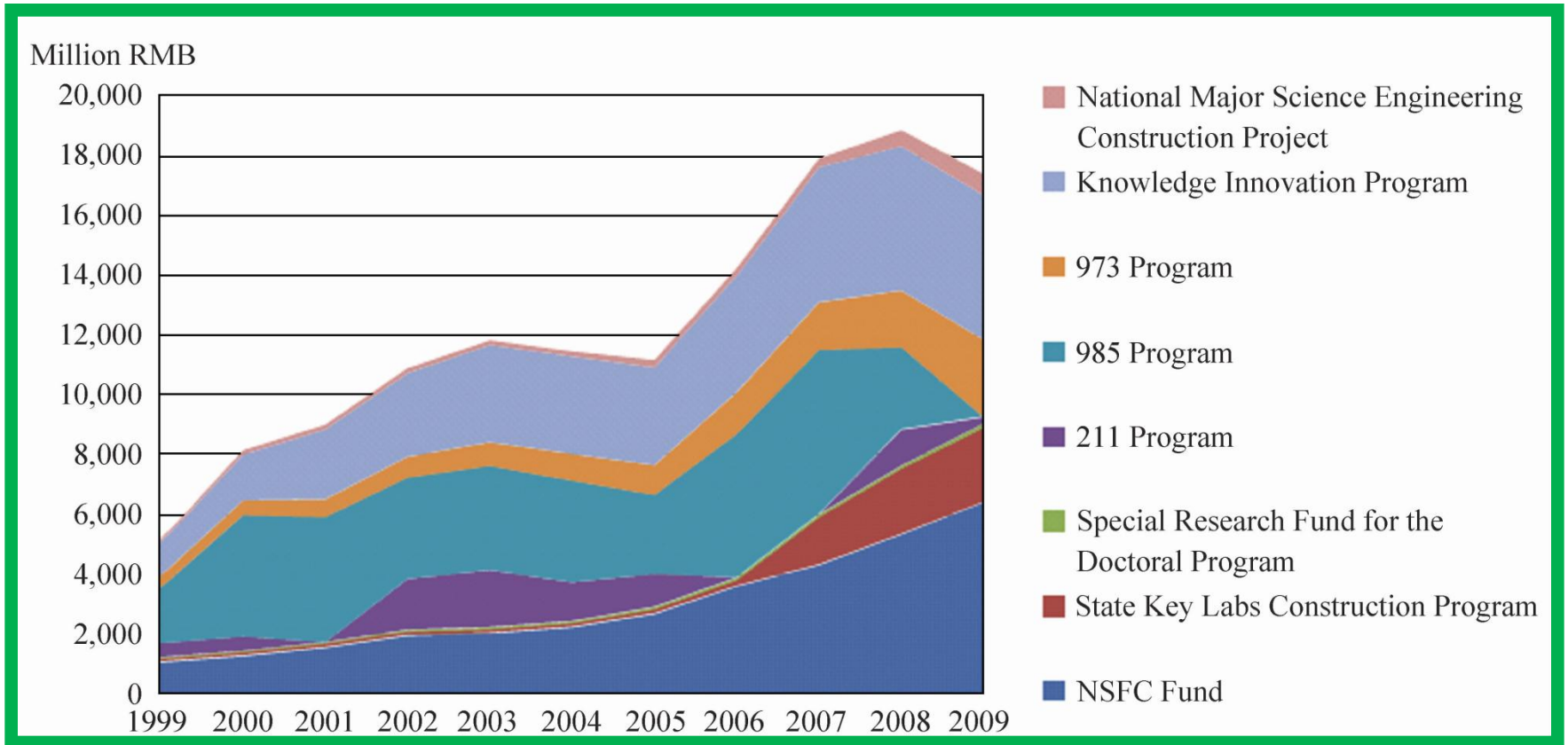
# Annual R&D Expenditure of China

1990-2009

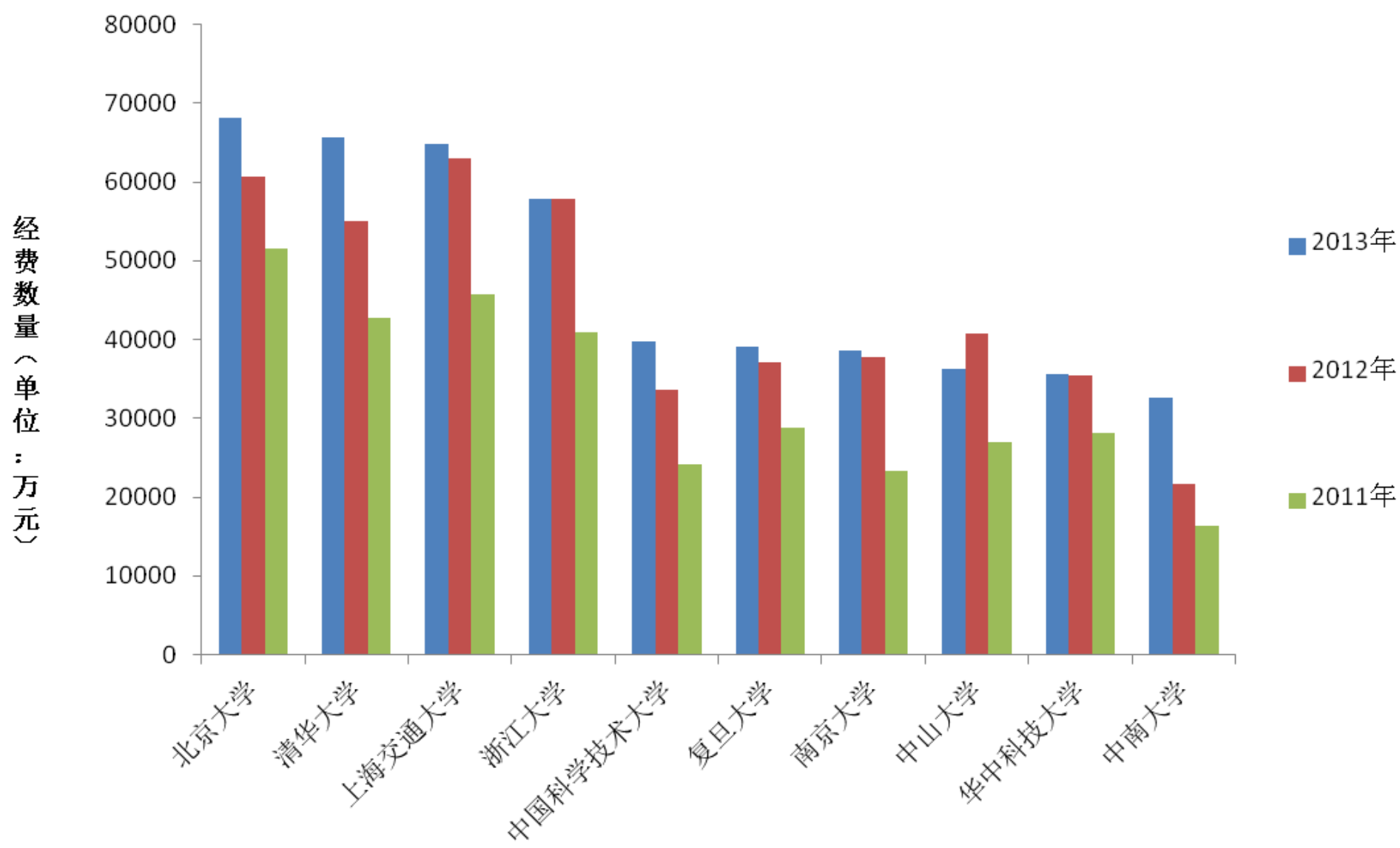


# Funding Channels of Basic Research

1999-2009



# 国家自然科学基金近三年前10位的体量变化



# 国家自然科学基金委

- **Fair** - 公平、公正、透明、依靠专家
- **Rewarding** - 最好的人才资助项目
- **Innovative** - 管理与时俱进
- **Efficient** - 管理成本只有1%
- **Numerous** - NSF 40%, >985+211, >重大专项+973
- **Diversified** - 资助谱系

**FRIEND of Scientists**

**科学之友 !**

# 科学基金与研究生教育的关系

- 选题导引
- 资助规模
- 同行交流
- 导师评价
- 论著标记
- 诚信监督



# 目标、愿景

- ◆ 筑探索之渊，
- ◆ 浚创新之源，
- ◆ 延交叉之远，
- ◆ 遂人才之愿。

# 筑探索之渊

探索：自下而上，自由探索

- ❑ 基金委的主要特点 — 基础性/决定性？
- ❑ 符合基础科研的主导规律
- ❑ 最大范围地服务广大学者
- ❑ 成为研究生教育的摇篮

# 筑探索之渊

## 渊：规模

- 中国有多少适宜于全职从事基础研究的人？
- 每项大约资助多少项为适宜？1.5-5.0万

三个5万人

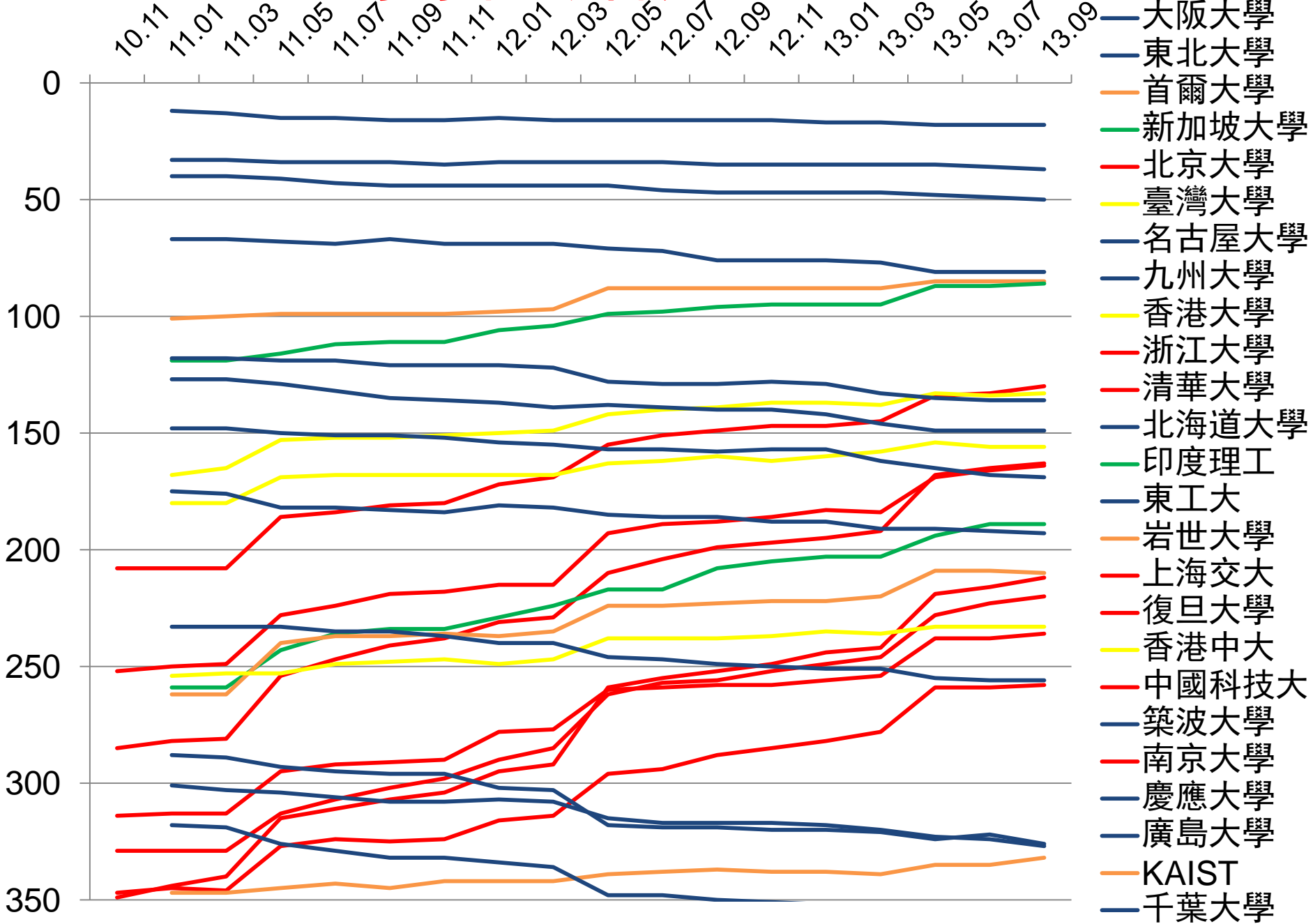
## 渊：结构

- 年龄结构（面上/青年）
- 组织结构（面上/重点/重大/科学计划/?）
- 地域结构（地区/联合基金）
- 类型结构（项目/人才/资源）

# 浚创新之源（从追踪到并行）

- 第一阶段：总量并行
- 第二阶段：过程并行
- 第三阶段：源头并行

# 亞洲大學學術影響力—201309



# 基础研究对CAS&C9的作用 - 学科高地

数学	院5 北36 清60 上64 复72 浙91 科103 南167 哈170 西211
物理	院2 科46 清60 北74 浙115 南142 上180 复223 哈374 西424
化学	院1 北24 清27 浙29 南32 科38 复39 上136 哈384 西527
地学	院1 北62 南133 科176 清388
心理学	北334 院351
工程	院1 清10 上15 浙33 哈34 西6 2 科86 北118 复205 南233
材料	院1 清6 浙26 上27 哈34 复41 科44 北50 南62 西93
计算机	院16 清33 浙83 上86 北141 西143 科191 哈212 复326 南369
空间科学	院39
生物	院21 北199 上238 浙249 清268 复285 南357 科436
分子生物	院59 复237 上247 北282 浙380 清433
微生物	院27 浙198 上286 复325 清424 北433
神经	院139 北243 复303 上413
免疫学	院175 浙365
临床医学	上281 北298 复340 院394 浙465 南864 西1209 清1551 科2238
药学	院6 北55 浙73 复113 上134 南285 西509
农学	院8 浙36 上285 北419
动植物学	院4 浙93 北252 复409 上540 清691 南726 西903
环境	院1 浙125 北128 清208 南257 复432 哈441 上451 科561
社科	院274 北289 清499 复561 浙796 西866 南882
经管	北152
跨学科	院16 浙69

数据来源 ESI (2013.11.05)

# 过程并行

- 铁基超导（科学观察）
- 中微子振荡
- 达芬奇
- 神经环路
- 量子通讯
- 基因组

# 源头并行

- 量子霍尔效应
- 非线性数学期望
- 洋葱结构的超硬材料
- 新结构经济学



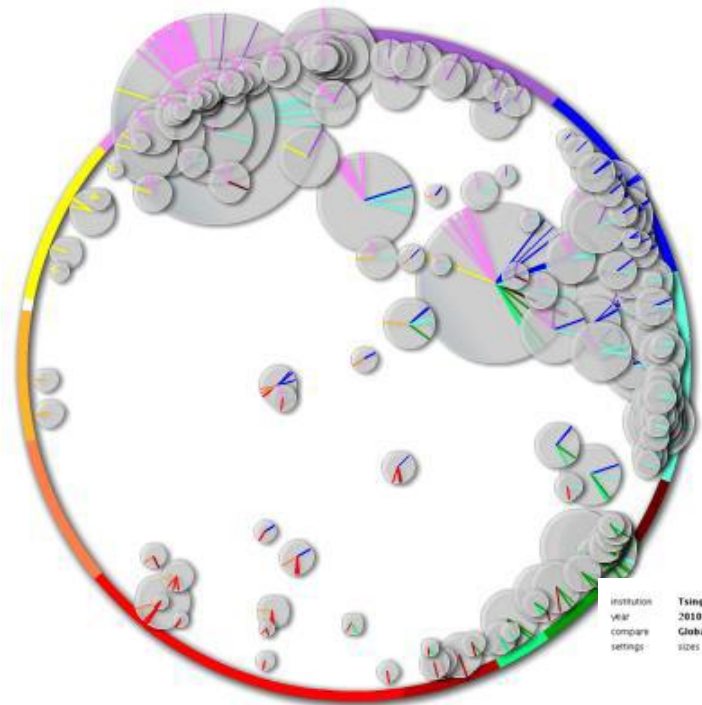
# 延交叉之远

## 我国交叉现状不好

- ❑ 学科泡图
- ❑ 固体力学与流体力学不相通
- ❑ 院系结构 — 双聘制度不普遍
- ❑ 重点（一级）学科评估
- ❑ 交叉评审难
- ❑ 无交叉学科目录（与欧美不同）

# 学科交叉状况 - 圆圈视图

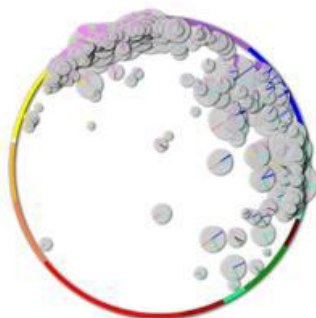
## 浙江大学



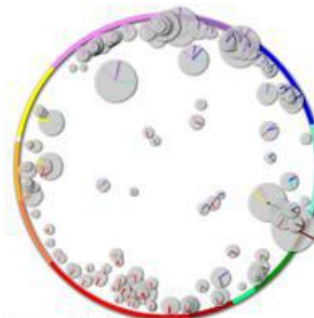
Institution: Tsinghua University  
Year: 2010  
Compare: Global  
Settings: sizes of circles on the maps are not normalized

Institution: Peking University  
Year: 2010  
Compare: Global  
Settings: sizes of circles on the maps are not normalized

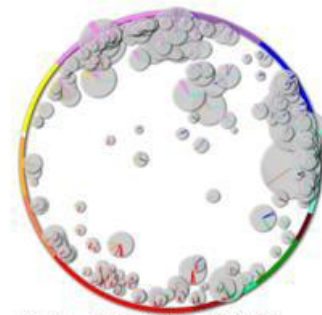
Institution: Shanghai Jiaotong University  
Year: 2010  
Compare: Global  
Settings: sizes of circles on the maps are not normalized



Institution: Harvard University  
Year: 2010  
Compare: Global  
Settings: sizes of circles on the maps are not normalized

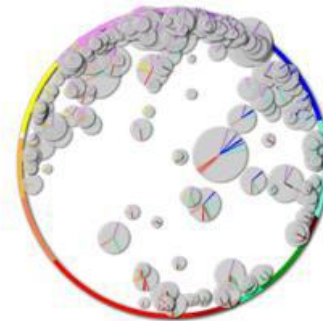
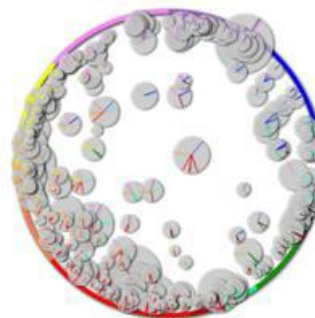
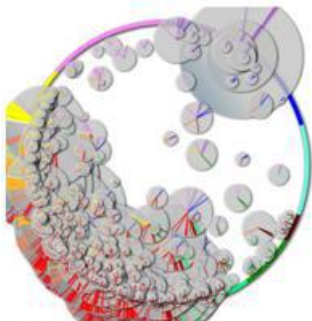


Institution: Stanford University  
Year: 2010  
Compare: Global  
Settings: sizes of circles on the maps are not normalized



Institution: Massachusetts Institute of Technology  
Year: 2010  
Compare: Global  
Settings: sizes of circles on the maps are not normalized

清华、上交大、北大  
哈佛、斯坦福、MIT



# 延交叉之远

## 需要破冰之旅

□ **不断调整方向的交叉研究中心**

□ **超级科学计划**

**细颗粒物污染、 脑科学、 数据科学、  
下一代微电子光电子**

□ **突破交叉评审**

**合成通讯评审+单列名额会评**

# 遂人才之愿

## 2014 GRC 北京宣言 9点陈述

### 什么是人才？

#### □ 人事部与教育部定义不同

人事部：贡献说 — 工作做出贡献；

教育部：过程说 — 人才培养

#### □ 人才是具有国际视野的（未来）领导者。

水平与潜能

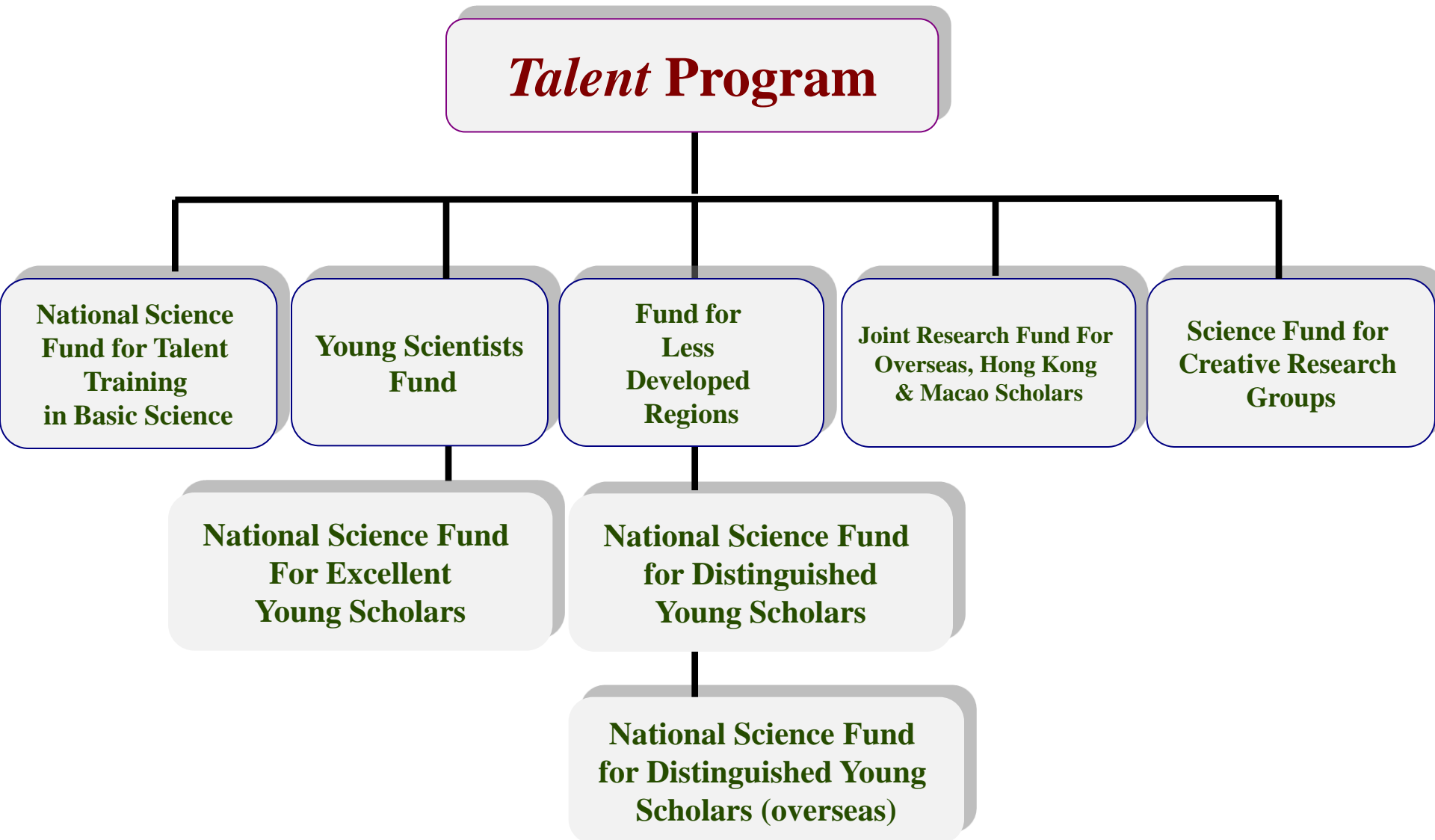
#### □ 基金委应造就基础研究方面的人才。

# NSFC – 资助教育就是资助未来

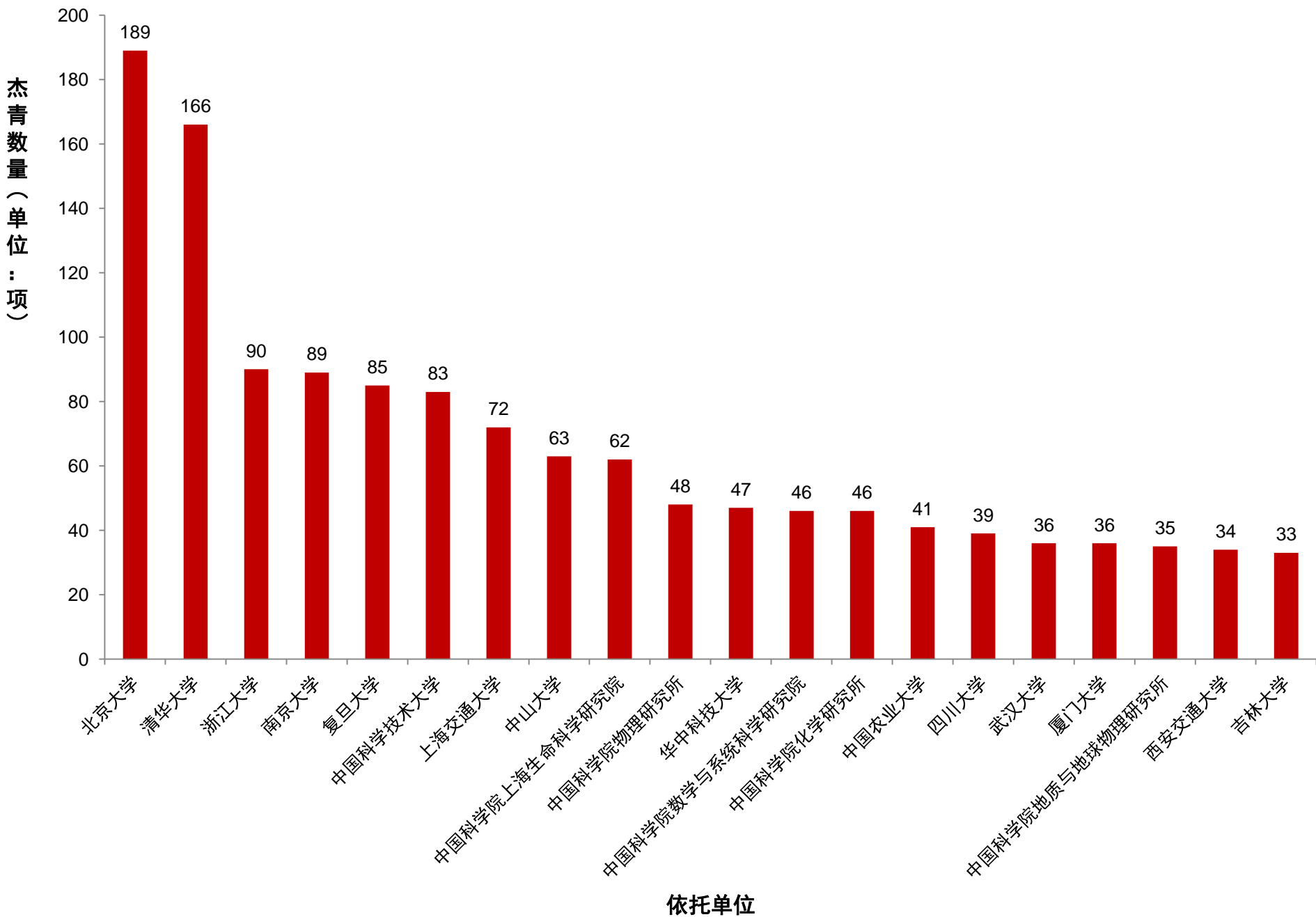
## GRC2014 “资助未来” 北京宣言

- 培养人才是最重要的使命。
- 促进科研与教育结合。
- 根据职业发展阶段构成人才资助项目体系。
- 培养跨学科背景的人才及跨学科团队。
- 支持女性走在研究前列。
- 鼓励青年科研人才的跨国界的自由流动。
- 拓展人才的国际视野
- 支持在信息教育体系的新构架
- 诚信与伦理教育

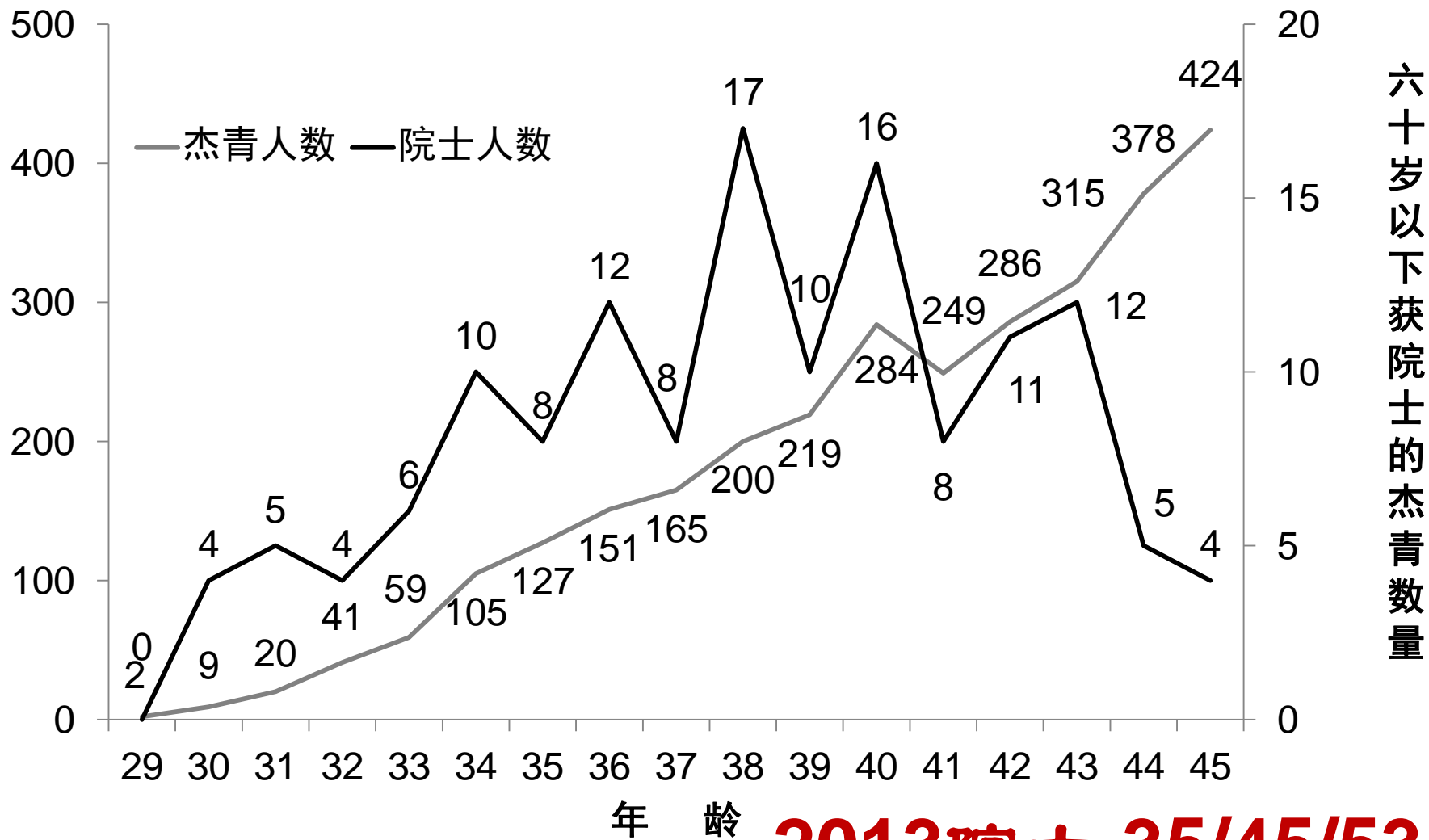
# NSFC – 完备的人才资助系列



# 国家杰出青年基金项目数量统计



各年龄段  
的杰青数量

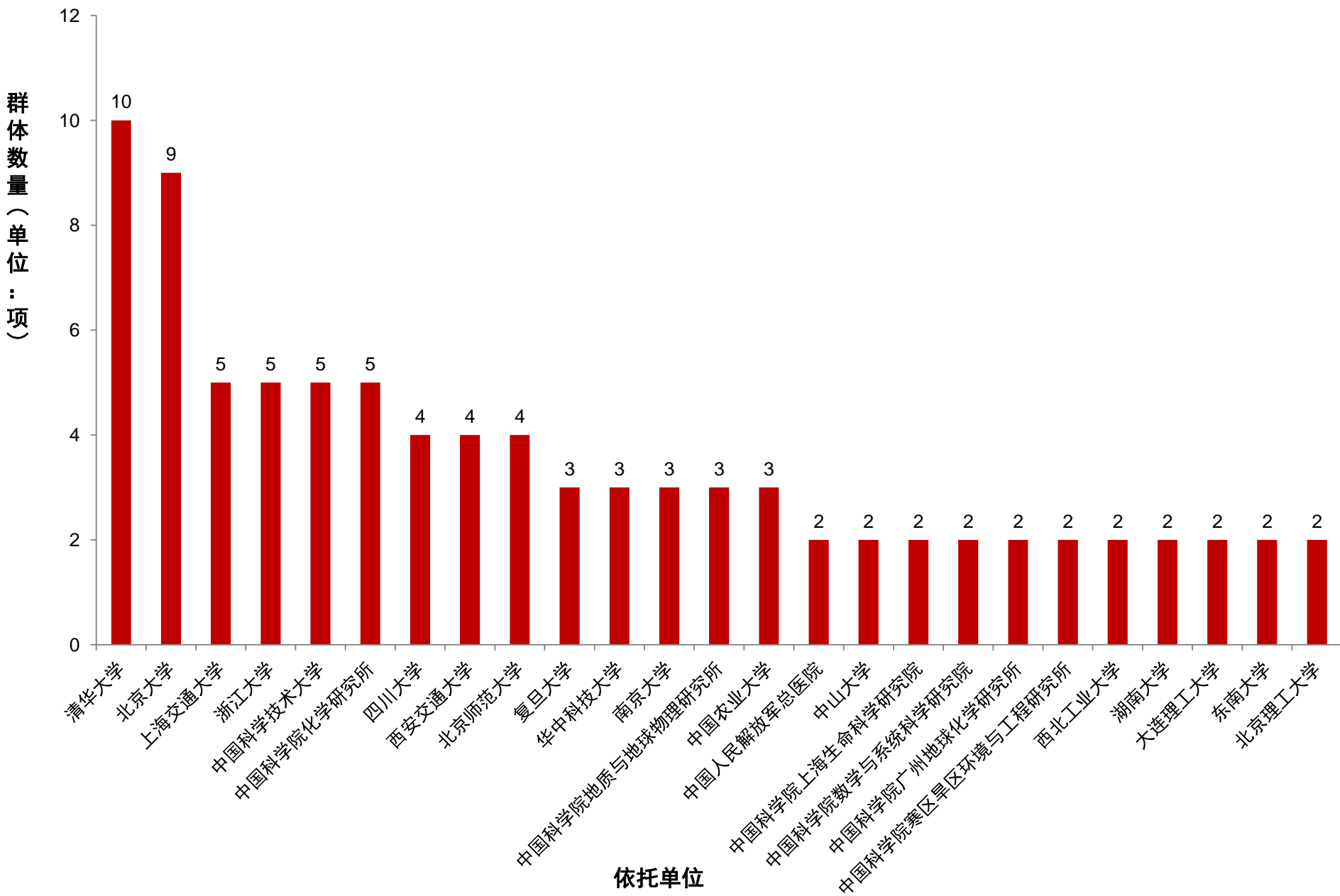


**2013院士 35/45/53**

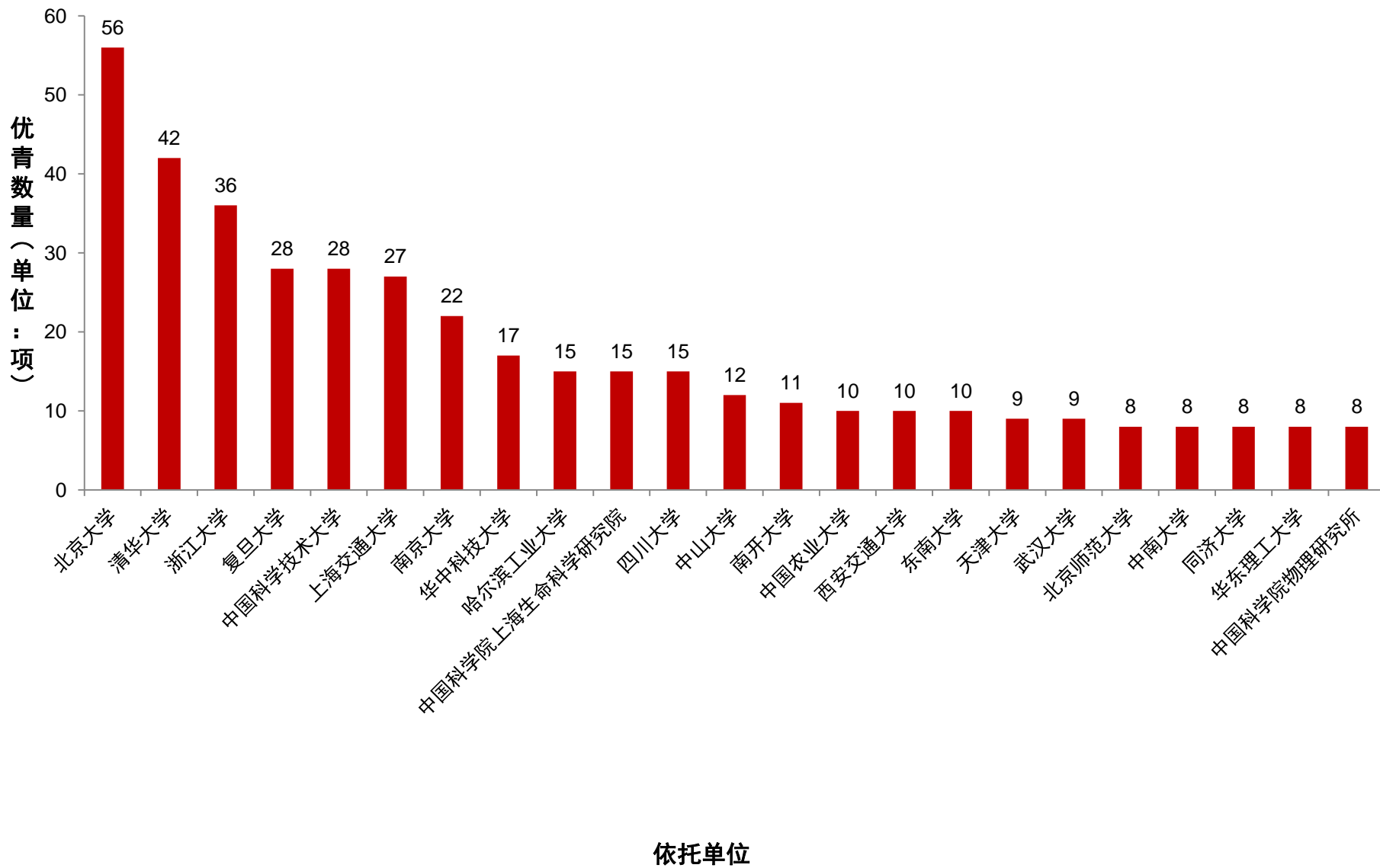
年龄(岁)	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
院士人数	0	4	5	4	6	10	8	12	8	17	10	16	8	11	12	5	4
杰青人数	2	9	20	41	59	105	127	151	165	200	219	284	249	286	315	378	424



# 创新研究群体项目数量统计



# 优秀青年基金项目数量统计



# 遂人才之愿

## 对目前人才资助谱系的思索

**(1) 力度不够，与中组部系列不协调**

**(青年千人，青年拔尖)**

**利用杰青20周年，加大力度**

**若有可能，融入其他青年人才计划**

**启动+研究**

**(2) 抑制人才谱系的高龄化、程序化趋势**

**不要年龄层状化，追求“宽带”年龄**

**(3) 考虑人才的稳定、可持续（但有竞争淘汰性）的支持方法**

# NSFC – 经费管理改革

## 基金委年底将出台管理新规定

### 间接费

- 开始设置间接费（15%）
- 课题申请者只填报直接费，依托单位加间接费
- 按照因素法确定间接费比例

### 劳务费

- 不设上限（30%为参考性建议）
- 确保研究生、博士后的劳务费支付卡制度

# NSFC – 近年20项重要成果

1. 非线性数学期望及其应用
2. 铁基高温超导
3. 大亚湾反应堆中微子实验：发现中微子的第三种振荡模式
4. 量子反常霍尔效应
5. 量子态分辨的化学反应动力学
6. 细胞自吞噬抑制剂及作用机制
7. 植物株型形成的分子调控机理研究
8. 脂稳态与代谢性疾病发生
9. 卡定地质历史时期最大生物灭绝事件的时间和速度
10. 阐明冰期-间冰期印度夏季风变迁的动力学机制
11. 新近纪哺乳动物、陆相地层与环境演变研究
12. 极硬材料的理论设计与实验合成
13. 纳米孪晶强韧化新机制
14. 燃烧反应动力学
15. 可扩展量子信息处理
16. “天河”高性能计算机体系结构创新
17. 流程工业生产与物流调度的理论与方法
18. 不确定性决策的理论、方法与应用
19. 抗感染天然免疫识别与免疫调控机制
20. 消除病理性记忆和心理渴求的模式

# 科学道德教育的有效性

□道德高地与道德底线相结合

□贴近实际、案例入手

□AAAS与CAST的案例讨论会

•中方案例与美方案例的特点

•中方—实际案例，楷模高、底面乱

•美方—虚拟案例，教育价值高、底层意识明

# 科学道德教育的柔性嵌入

□ 从一本书说起 - 《研究诚信》

□ 我们的科学道德教育要两手抓

• 强势宣传——

阵势要大，风力要足，普及要透

• 柔性嵌入——

水银泻地，贴近生动，参考性强

# Ethics –

## *Nature* 12/01/2012

### pp.134-136

FEATURE NEWS



QILAI SHEN/PANOS

Yang Wei wants to reform attitudes towards research ethics at Zhejiang University and across the country.

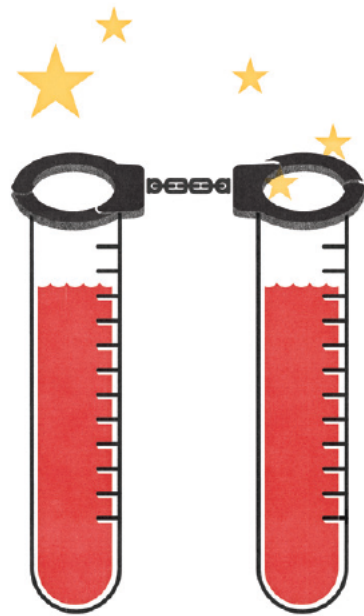
BY DAVID CYRANOSKI

**Y**ang Wei has an easy smile and a carefree, even distracted, air — but he takes such a solemn approach to life that his wife sometimes tells him to relax. “I take everything seriously,” he says.

The former materials scientist certainly took it seriously when, two years after he became president of Zhejiang University (ZJU) in Hangzhou, China, he faced a case of scientific misconduct that became a turning point for his presidency. In early October 2008, the editor of the *International Journal of Cardiology* discovered that figures in a manuscript by He Haibo, a scientist researching traditional Chinese medicine who had been hired by the ZJU only months before, were suspiciously similar to those in an article that He had published elsewhere. Confronted, He quickly owned up, submitting a 12-page confession to Yang on 26 October.

But the case, which eventually led to the retraction of eight papers, spiralled into an international media catastrophe for the ZJU, one of China's oldest and largest universities, as well as one of the most successful in publishing science. Articles attacked the laxity of a system that gave leadership roles to the likes of Li Lianda, dean of the department of pharmaceutical sciences and He's supervisor, who was

# ZERO TOLERANCE



## A UNIVERSITY CRACKS DOWN ON MISCONDUCT IN CHINA.

them to the national calligraphy cent. signatures were identical to He's own. Yang. “Even I could tell that.”

In March 2009, the ZJU fired He, terminated the contract of Wu Limao, a co-author of several of He's papers and the laboratory manager in Li's absence, and took away Li's dean position for graduate students.

Yang didn't stop there: he launched a campaign to make the ZJU more responsible for scientific misconduct. With an energetic colleague named Yuehong (Helen) Zhang cracking down on the university's journals (see ‘Police the plagiarists’), and assistance from a group of university administrators who share a strong determination and commitment to a zero-tolerance policy for misconduct, Yang hopes to turn ZJU into a role model that can help to restore China's reputation for rife scientific misconduct. That reputation, exacerbated in the five years by a string of high-profile cases (*Nature* 441, 392–393; 2006), has made university leaders and journal editors increasingly sceptical of the ability of Chinese research institutions to ensure trustworthy science.

Yang, who now tours the country giving lectures on scientific integrity, has established a reputation as the most evangelical of reformers. His collaborators are im-



# Editorial – *Science* 29/11/2013 p. 1079



Wei Yang is president of the National Natural Science Foundation of China and a professor in the Institute of Applied Mechanics at Zhejiang University, Hangzhou, China. E-mail: yangwei@nsof.gov.cn.

## Research Integrity in China

CHINA'S RESEARCH CAPACITY HAS GROWN DRAMATICALLY IN THE PAST DECADE, AN EXPANSION THAT is reshaping the landscape of global scientific investigation. This rapid growth has not necessarily been accompanied by an equally measured promotion of the cultural norms of the scientific enterprise. Most troubling is a lack of research integrity, which may hinder China's growth in original science, damage the reputation of Chinese academics, and dampen the impact of science developed in China.

An unhealthy research environment in China is being driven by several factors. In many research-intensive universities and institutions, competitive research grants constitute oversized fractions of their budgets, providing an economic incentive for ethical violations. Misconduct is also inadvertently encouraged by the use of quantitative rather than qualitative measures of merit, which can lure young scientists to climb the academic ladder by stepping outside ethical boundaries. Performance-based subsidiary income is a policy that can entice scientists to act unethically. And there is a talent hierarchy in academia that encourages scientists to overblow their findings.

The good news is that several pivotal events over the past decade mark the long march toward research integrity in China. The first event at the beginning of the 21st century was to ban multiple submissions of a paper to journals, after clarifying a delicate issue of the translation rights for bilingual submissions. The copyright law was also revised to allow a longer embargo period to accommodate the review time required for technical papers. The allegations of whistleblowers, mostly anonymous, have led to a majority of crackdowns, as evidenced by my own handling of more than 80% of research misconduct cases at Zhejiang University. In addition, action by the media to expose research misconduct, ranging from plagiarism and retractions in the He Haibo event, to the fraudulent "Hanxin" computer chips, has stoked a hostile public intolerance for misconduct, prompting politicians to acknowledge that a serious problem exists.

There is now a massive education effort by the China Association for Science and Technology (CAST) and Ministry of Education (MoE) to train graduate students, postdoctoral fellows, and young faculty in research ethics. There is a new emphasis on a code of ethics, put forth by the Chinese Academy of Sciences (CAS), CAST, and the National Natural Science Foundation of China (NSFC), to guide researchers in the life sciences. Major universities as well as CAS have revised the criteria for promotion to emphasize the quality of research contributions rather than the number of publications by a researcher. And since 1998, there has been active censoring by the NSFC of scientists who submit plagiarized grant applications. This campaign has resulted in a decline of 70% in the fraction of alleged application misconduct over the past 14 years. At a press conference in August 2013, the NSFC revealed six cases of misconduct discovered by comparing submitted and funded proposals, including a "proposal for sale," similar to manuscripts for sale described in the News story on p. 1035. Moreover, in 2012, the Chinese government began other surveillance and inspections of submitted research proposals to complement the efforts of research funding agencies in safeguarding the ethical use of research dollars.

Help from the global science community has been an important factor in promoting integrity in China. For example, a dialogue between the American Association for the Advancement of Science and CAST has focused on drafting guidelines and casebooks to prevent misconduct. The movement of cultivating standards for scientific integrity by the Global Research Council is also gaining momentum in China and other nations.

Many challenges lie ahead in achieving zero tolerance for unethical behavior. China is still grappling with the incorporation of panel reviewers, promotion committees, and prize nominators in the systems that award grants and titles. The development of good science in China should accomplish three goals: to produce original breakthroughs, to advance understanding from discoveries made elsewhere, and to gain global influence. None of this can happen until the scientific enterprise is healthy and credible.

— Wei Yang



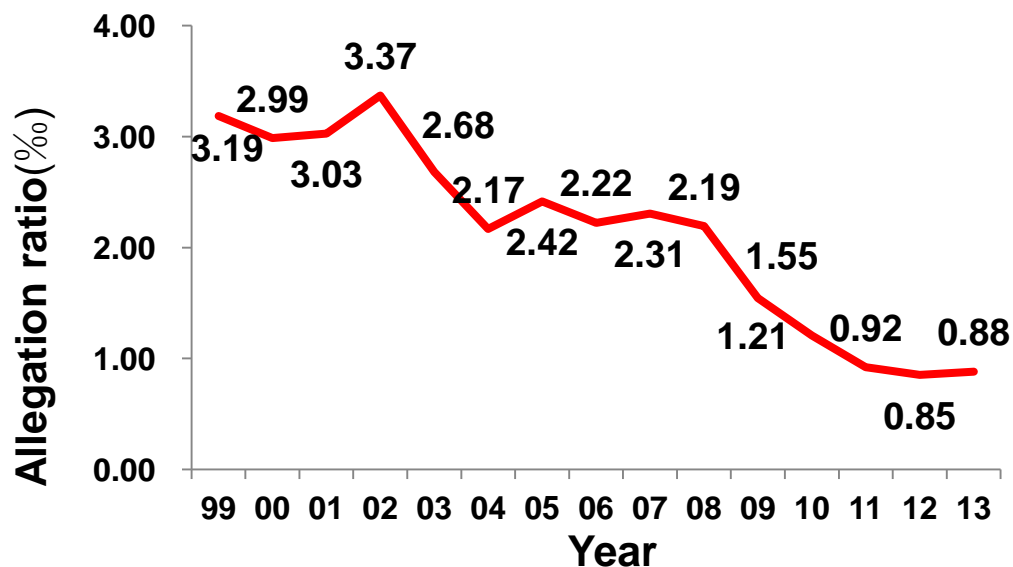
CREDITS (TOP LEFT): XING/REUTERS; G. GRALLON/SCIENCE, ADAPTED FROM WIKIMEDIA COMMONS

10.1126/scienc.1247700

# 国家自然科学基金委的诚信建设

## — 建立监督委员会

- 监督委员会于1998年12月成立。
- 宗旨是维护科学基金制的公正性、科学性和科技工作者的权益，弘扬科学道德，惩治科学不端行为，营造有利于科技创新的环境，促进国家自然科学基金事业的健康发展。
- 监督委员会是我国科技管理部门所成立的第一个学术监督机构。



# 近三年投诉举报案件总体情况

共收到投诉举报417件

实名136件 (32.6%)

匿名281件 (67.4%)

受理194件 (46.5%)

不予受理223件 (53.5%)

经调查无举报  
问题134件  
(占受理案卷  
69.1%)

上会审议101  
件 (占受理案卷  
52.1%)，84人  
次受到处罚

含杰青异议期  
举报案件24件

内部通报批评47人次

通报批评4人次

撤销项目31项

取消申请资格29人次 (其中1~2年  
17人次，2~4年8人次，4年以上4  
人次)

# 利用“项目相似性检测系统”检测

**对2012年受理项目整体相似性大于50%的申请书进行检测**

- 1、有335项申请与2008-2011年已资助项目重复，其中自己获资助后再申请有169项，利用他人获资助后再申请有166项；**
- 2、有102项重复申请，其中与自己重复的有6项，与他人重复有96项。**
- 3、2011年申请未获资助，2012年再度申请，整体相似性大于大于80%的有10996对（7.00%）。**

# 抄袭剽窃导师已资助项目，且变造数据， 有意弄虚作假

经相似性系统比对，发现山东某大学任升峰2012年度基金项目申请书与他人2008年获得资助项目申请书高度相似，整体相似度达95.1%，研究内容相似度99.2%（课题组和单位没交叉）。

经调查核实，任升峰具有多种严重的不端行为：全文抄袭剽窃其导师早在2008年已获资助项目申请书。盗用导师在美国的研究成果为自己的研究基础并虚构国际合作人员。更为严重的是，为展示掌握了该领域最新动态，任升峰将抄袭来的12篇参考文献中10篇的出版日期篡改成近期（如将2000年篡改成2010年，杂志名、文章名不变，个别页码也做了篡改）。

# 网上“购买”申请书

---湖南某大学彭国星、福建某大学余文琼

2012年，通过相似度系统比对，发现地域跨度遥远的湖南某大学彭国星与福建某大学余文琼在2012年度申请书高度相似（整体相似度为97.1%，研究内容相似度99.3%）

当事人彭国星说：申报项目时，感觉精力有限，压力很大，没准备好申请书。在这紧要关头，有位自称刘洽邦的人，发信息说可以提供基金项目申请书，且通过率很高。通过讨价还价，达成条件是：交1800元，可以阅读基金目标书；如果满意，决定利用该标书申报基金项目，再交1000元；如果获得资助，再交18000元。彭于2011年11月顺利买到基金项目申请书。

当事人余文琼说，2012年基金项目申请书初稿完成后，为了提高和完善，在网上搜索了很久，终于找到“润色公司—网上专家”，通过QQ将材料发给他。当获得网上专家修改后的申请书后，余通过银行柜员机汇5000元辛苦费给“润色公司”。由于余文琼电脑崩盘，对上述网上专家是否利用余文琼原稿件一事，余文琼不能提供任何相关证明。

经调查核实，彭国星、余文琼分别花钱从网上“中介公司”买到申请书，分别申报2012年度国家自然科学基金面上项目。



**谢谢大家！**



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